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(74) Agent: GROENENDAAL, Antonius, W., M.; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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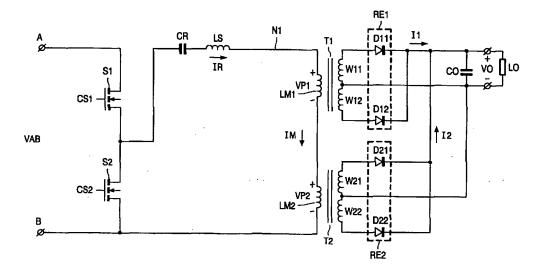
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(54) Title: LLC HALF-BRIDGE CONVERTER



(57) Abstract: A resonant LLC-power converter comprises at least two transformers (T1, T2) of which the primary windings (LM1, LM2) are connected in series. Each one of the transformers (T1, T2) has a secondary winding (W1, W2; W11, W12, W21, W22) which supplies a non-zero current to the same load (LO) during the same period of time (TC).

## INTERNATIONAL SEARCH REPORT

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	C. DOCUMENTS CONSIDERED TO BE RELEVANT						
Category °	ry ° Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No.						
х	US 5 694 304 A (PELLERIN SHARON ET AL) 1,5,6 2 December 1997 (1997-12-02)						
	column 11, line 57 -column 12, li	ne 37;					
[	figure 4						
Α	US 6 344 979 B1 (HUANG GUISONG E	T AL)	1-6				
	5 February 2002 (2002-02-05) cited in the application						
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## INTERNATIONAL SEARCH REPORT

PCT/IB 03/01318

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5694304	Α	02-12-1997	US	5712772 A	27-01-1998
US 6344979	B1	05-02-2002	CN TW	1368787 A 533669 B	11-09-2002 21-05-2003